

CO₂ values must be within $\pm 4\%$ of the uncorrected value.

(4) If the test is not validated for drift as described in paragraph (b)(1) of this section, you may consider the test results for the duty cycle to be valid only if, using good engineering judgment, the observed drift does not affect your ability to demonstrate compliance with the applicable emission standards. For example, if the drift-corrected value is less than the standard by at least two times the absolute difference between the uncorrected and corrected values, you may consider the data to be valid for demonstrating compliance with the applicable standard.

[73 FR 37322, June 30, 2008, as amended at 74 FR 56515, Oct. 30, 2009; 75 FR 23044, Apr. 30, 2010; 75 FR 68463, Nov. 8, 2010; 76 FR 57451, Sept. 15, 2011]

§ 1065.590 PM sampling media (e.g., filters) preconditioning and tare weighing.

Before an emission test, take the following steps to prepare PM sampling media (e.g., filters) and equipment for PM measurements:

(a) Make sure the balance and PM-stabilization environments meet the periodic verifications in §1065.390.

(b) Visually inspect unused sample media (e.g., filters) for defects and discard defective media.

(c) To handle PM sampling media (e.g., filters), use electrically grounded tweezers or a grounding strap, as described in §1065.190.

(d) Place unused sample media (e.g., filters) in one or more containers that are open to the PM-stabilization environment. If you are using filters, you may place them in the bottom half of a filter cassette.

(e) Stabilize sample media (e.g., filters) in the PM-stabilization environment. Consider an unused sample medium stabilized as long as it has been in the PM-stabilization environment for a minimum of 30 min, during which the PM-stabilization environment has been within the specifications of §1065.190.

(f) Weigh the sample media (e.g., filters) automatically or manually, as follows:

(1) For automatic weighing, follow the automation system manufacturer's instructions to prepare samples for weighing. This may include placing the samples in a special container.

(2) For manual weighing, use good engineering judgment to determine if substitution weighing is necessary to show that an engine meets the applicable standard. You may follow the substitution weighing procedure in paragraph (j) of this section, or you may develop your own procedure.

(g) Correct the measured mass of each sample medium (e.g., filter) for buoyancy as described in §1065.690. These buoyancy-corrected values are subsequently subtracted from the post-test mass of the corresponding sample media (e.g., filters) and collected PM to determine the mass of PM emitted during the test.

(h) You may repeat measurements to determine the mean mass of each sample medium (e.g., filter). Use good engineering judgment to exclude outliers from the calculation of mean mass values.

(i) If you use filters as sample media, load unused filters that have been tare-weighed into clean filter cassettes and place the loaded cassettes in a clean, covered or sealed container before removing them from the stabilization environment for transport to the test site for sampling. We recommend that you keep filter cassettes clean by periodically washing or wiping them with a compatible solvent applied using a lint-free cloth. Depending upon your cassette material, ethanol (C₂H₅OH) might be an acceptable solvent. Your cleaning frequency will depend on your engine's level of PM and HC emissions.

(j) Substitution weighing involves measurement of a reference weight before and after each weighing of PM sampling media (e.g., filters). While substitution weighing requires more measurements, it corrects for a balance's zero-drift and it relies on balance linearity only over a small range. This is most advantageous when quantifying net PM masses that are less than 0.1% of the sample medium's mass. However, it may not be advantageous when net PM masses exceed 1% of the sample medium's mass. If you utilize substitution weighing, it must

be used for both pre-test and post-test weighing. The same substitution weight must be used for both pre-test and post-test weighing. Correct the mass of the substitution weight for buoyancy if the density of the substitution weight is less than 2.0 g/cm³. The following steps are an example of substitution weighing:

(1) Use electrically grounded tweezers or a grounding strap, as described in § 1065.190.

(2) Use a static neutralizer as described in § 1065.190 to minimize static electric charge on any object before it is placed on the balance pan.

(3) Select a substitution weight that meets the requirements for calibration weights found in § 1065.790. The substitution weight must also have the same density as the weight you use to span the microbalance, and be similar in mass to an unused sample medium (e.g., filter). A 47 mm PTFE membrane filter will typically have a mass in the range of 80 to 100 mg.

(4) Record the stable balance reading, then remove the calibration weight.

(5) Weigh an unused sample medium (e.g., a new filter), record the stable balance reading and record the balance environment's dewpoint, ambient temperature, and atmospheric pressure.

(6) Reweigh the calibration weight and record the stable balance reading.

(7) Calculate the arithmetic mean of the two calibration-weight readings that you recorded immediately before and after weighing the unused sample. Subtract that mean value from the unused sample reading, then add the true mass of the calibration weight as stated on the calibration-weight certificate. Record this result. This is the unused sample's tare weight without correcting for buoyancy.

(8) Repeat these substitution-weighing steps for the remainder of your unused sample media.

(9) Once weighing is completed, follow the instructions given in paragraphs (g) through (i) of this section.

[73 FR 37323, June 30, 2008]

§ 1065.595 PM sample post-conditioning and total weighing.

After testing is complete, return the sample media (e.g., filters) to the

weighing and PM-stabilization environments.

(a) Make sure the weighing and PM-stabilization environments meet the ambient condition specifications in § 1065.190(e)(1). If those specifications are not met, leave the test sample media (e.g., filters) covered until proper conditions have been met.

(b) In the PM-stabilization environment, remove PM samples from sealed containers. If you use filters, you may remove them from their cassettes before or after stabilization. We recommend always removing the top portion of the cassette before stabilization. When you remove a filter from a cassette, separate the top half of the cassette from the bottom half using a cassette separator designed for this purpose.

(c) To handle PM samples, use electrically grounded tweezers or a grounding strap, as described in § 1065.190.

(d) Visually inspect the sampling media (e.g., filters) and collected particulate. If either the sample media (e.g., filters) or particulate sample appear to have been compromised, or the particulate matter contacts any surface other than the filter, the sample may not be used to determine particulate emissions. In the case of contact with another surface, clean the affected surface before continuing.

(e) To stabilize PM samples, place them in one or more containers that are open to the PM-stabilization environment, as described in § 1065.190. If you expect that a sample medium's (e.g., filter's) total surface concentration of PM will be less than 400 µg, assuming a 38 mm diameter filter stain area, expose the filter to a PM-stabilization environment meeting the specifications of § 1065.190 for at least 30 minutes before weighing. If you expect a higher PM concentration or do not know what PM concentration to expect, expose the filter to the stabilization environment for at least 60 minutes before weighing. Note that 400 µg on sample media (e.g., filters) is an approximate net mass of 0.07 g/kW-hr for a hot-start test with compression-ignition engines tested according to 40 CFR part 86, subpart N, or 50 mg/mile for light-duty vehicles tested according to 40 CFR part 86, subpart B.